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Can Trading's Playing Field Be Levelled?

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The physical limitations of the wireless links among the equities-trading data centers in New Jersey give trading firms that own their own links – or have private bandwidth on providers' links – a speed advantage. But a new service, using a different part of the frequency spectrum, may eliminate that advantage. With similar issues in the trading of European equities in the triangle of data centers around London, to level the playing field, regulators will need to get into the details.

There's a big change underway in the material infrastructure of how US shares are traded. It's in how data is transmitted among the four computer data centers in northern New Jersey in which nearly all US share trading takes place. Some trading firms currently enjoy a physical advantage in this transmission. The famous account in Michael Lewis's "Flash Boys" is both simplistic and dated, but there's no doubt that a trading firm gets an edge if it can receive data before others do. That advantage, though, may soon disappear.

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The three US exchange groups (the New York Stock Exchange, Nasdaq and BATS/Chicago Board Options Exchange) make genuine efforts to ensure fair data distribution within their data centers. But how market data gets from one data center to another also matters. Light in a fiber-optic cable is slowed by the material of the cable to two-thirds of its speed in free space, so the quickest form of transmission is wireless. Seven competing wireless networks connect the New Jersey data centers. All use frequencies in what's called 'E-band' (70-80 gigahertz), frequencies that were readily available when the networks were created around six years ago. The networks all thus employ essentially the same radio technology, which is vulnerable to disruption by rain and has limited capacity: most links have a bandwidth of around only one gigabit per second.

Each exchange supplies trading firms with raw data feeds that are in effect public (although you have to pay for them), and the NYSE and Nasdaq each have an arrangement with one of the networks to transmit its data feeds wirelessly to the other data centers. Those quasi-public data feeds, though, can substantially exceed the one-gigabit capacity of the links, causing delay when large volumes of data have to enter what is in effect a narrow wireless pipe. If, however, a trading firm has its own E-band network, or is paying a provider for private bandwidth, it can 'edit' the data feed radically before transmitting it, preserving only the 'signals' that will inform its computerized trading. That edited, private data feed will readily fit into a gigabit pipe, making it often faster than the unedited quasi-public feed and giving its owner an important edge.

One of the network providers, McKay Brothers, has, however, gone back to the future, so to speak. In 1998-99, the Federal Communications Commission auctioned a frequency band known as LMDS (Local Multipoint Distribution Service, 26-31.3 gigahertz). Back then, it was believed that this band would be used for television, but that didn't happen, and four years ago McKay was able to acquire LMDS spectrum in the triangle of New Jersey in which the data centers are located. Since then, McKay has been quietly working with manufacturers to develop high-quality LMDS radios. That is technologically more

straightforward than in the higher E-band frequencies, and McKay reports achieving an LMDS bandwidth of seven gigabits per second, enough nearly always to transmit the full quasi-public data feeds without either substantial editing or significant delays.

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That’s the commercial service that McKay plans to sell to trading firms. Because unedited quasi-public data will then be available as fast or faster than edited data transmitted over private links, a larger range of firms will be able to participate on a more equal basis in trading US shares. The consequences for price discovery and liquidity provision can’t be known with certainty – it could be an interesting ‘event study’ for economists – but it’s clearly possible that market quality will improve.

Could the playing field similarly be leveled in Europe? Most European share trading takes place in a triangle of data centers in the UK – in Slough, Basildon and central London – linked, as in New Jersey, by limited-capacity wireless connections. (The fastest transatlantic cable makes landfall in southwest England, but, despite infrastructural advantages of that kind, Brexit will probably lead to a gradual shift of equities trading to the Continent. However, the trading at least of UK shares is likely to continue to be based in this Greater London triangle.) As in New Jersey, it is very likely that ‘edited’ private data feeds are also faster than public data in that triangle: I’m told that there are at least four HFT-owned private wireless links. Stéphane Tyč of McKay Brothers says, however, that it should be technically possible to “provide public data to all on a level playing field” in Europe too.

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Traders, though, now measure time in nanoseconds (billionths of a second), and in a nanosecond even a wireless signal can travel no more than 30 centimeters, or roughly a foot. This means that trading’s material infrastructure involves more than frequency bands and good radios. Where you’re allowed to place your radio (on the data center’s roof or simply on a nearby building?) matters too, as does the length of the cables inside the data center that connect a network provider’s distribution panel to trading firms’ computer servers. “Having the best wireless link doesn’t necessarily help you unless there is equal access, both to the trading data center and inside it,” says Tyč.

The exact locations of radios and precise lengths of cables are examples of what I think of as the ‘material political economy’ of trading: They are issues of physical infrastructure that can have substantial economic and even public policy consequences, especially as trading becomes ever faster. If financial regulators want to level trading’s playing field, they are going to have to pay much more attention to its material political economy.

The author has no affiliation to McKay Brothers.

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